

Requirements for Rooms and Facilities Accommodating Radiation Sources, for the Construction Elements thereof, and for Safe Use of Radiation Sources

Regulation No. 82 of 24 August 1999 of the Minister of Environment

This Regulation has been established pursuant to subsection 1 of section 23 of the Radiation Protection Act (RT (State Gazette) I 1997, 37/38, 569; 1998, 97, 1520).

I General Provisions

1. This Regulation establishes general requirements for rooms and facilities accommodating radiation sources, for the construction elements thereof, and for use of radiation sources. Safety requirements for equipment permitted to be used in diagnosing and medical treatment of illnesses caused by radiation are established by Regulation No. 56 “Requirements for the Use of Radiology in Diagnosing and Treating of Illnesses, and Protection Requirements for Persons Being Medically Exposed” (RTL (Annex to the State Gazette) 1998, 351/352, 1464) of 13 November 1998 of the Minister of Social Affairs.
2. In rooms and facilities accommodating radiation sources, licensees for activities involving radiation shall apply safety measures according to the magnitude of external or internal radiation doses caused by radiation sources, and taking into account the specific features of radiation sources, in cases where:
 1. effective doses received by radiation workers may be higher than 1 mSv/year; or
 2. equivalent doses absorbed by crystalline lenses, skin tissue and extremities of radiation workers may be higher than 10% of the limits established by section 13 of the Radiation Protection Act.

II Requirements for Rooms and Facilities Accommodating Radiation Sources

1. In the cases specified in clause 2 of these Requirements, licensees for activities involving radiation shall establish either controlled areas or supervised areas or both in the rooms and facilities accommodating radiation sources.
2. A controlled area means a marked area located within the sphere of influence of a radiation source and exposed to the dose rate of 1 – 20 mSv/year, where special measures are applied to ensure protection against ionising radiation and to prevent the spreading of radioactive contamination, and which is subject to controlled access.
3. A supervised area means a area bordering a controlled area or a radiation source, marked if necessary, where application of special protection measures and safety requirements is usually not necessary but occupational exposure is monitored for radiation safety purpose to ensure that the dose rate in the supervised area does not exceed 1 mSv/year.

4. Licensees for activities involving radiation shall establish radiation safety requirements for controlled or supervised areas and shall monitor working conditions in the above-mentioned areas.
5. The Radiation Protection Centre shall draw up guidelines for the establishment of controlled areas and supervised areas in rooms and facilities taking into account the specific circumstances and conditions of the individual sites.
6. When establishing a controlled or supervised area, and with regard to issues concerning safe use of radiation sources, licensees for activities involving radiation shall consult radiation safety experts as appropriate.
7. Controlled areas shall be marked with physical objects (walls, doors, benches, bands, etc.).
8. In order to prevent the possible spreading of radiation contamination, licensees for activities involving radiation shall control access to controlled areas and the taking of objects and materials into and out of the controlled area.
9. Controlled areas may be divided into different zones (“red”, “blue”), depending on the levels of radiation and concentrations of activity of radioactive substances in the air or on surfaces.
10. All entrances to controlled areas shall be equipped with at least one of the following devices or at least one of the following measures shall be applied there:
 1. alarm system which is activated by unauthorised entrance into the controlled area, and gives an easily distinguishable sound or light signal to the person on guard in the area and to the person entering the controlled area;
 2. locking of doors;
 3. continuous guarding.
1. In the case of a possible accident or any event posing a potential risk, exit from controlled areas must not be hindered.
2. Every person entering a controlled area must be supplied with a calibrated and functioning personal dosimeter.
3. Licensees for activities involving radiation shall apply technological or other measures (protection cells, ventilation) to reduce concentrations of radioactive substances generated by radiation sources in the air of controlled areas. If it is not expedient to apply such measures, the number of working hours of radiation workers in controlled areas shall be limited or respiratory personal protective devices used in order to reduce internal radiation doses of radiation workers.
4. Information on the current radiation situation in the area shall be posted in a clearly visible place at the entrance of a controlled area.
5. Appropriate special protective clothing must be available at the entrance of each controlled area and all persons entering such area must put on a special protective clothing.
6. A controlled area shall be entered and exited only through a single passage that must be equipped for measuring radiological contamination of persons and objects and materials used in the controlled area, for washing and for collecting the special protective clothing worn in the area.

7. Persons and objects contaminated with radioactivity during their stay in a controlled area must be decontaminated.
8. In order to attenuate radiation, a special material (radiation shield) shall be interposed between radiation sources and persons, devices or other objects.
9. Radiation shields in rooms accommodating radiation sources shall be designed to ensure that during simultaneous use of radiation sources located in the room, or at maximum potentials of electrical radiation sources located in the room, the dose rate does not exceed:
 1. in controlled areas, 20 mSv/year;
 2. in supervised areas 1 mSv/year.
1. Facilities for accommodation of radiation sources must be designed to ensure minimum discharge of radioactive waste into the environment both in normal situations and in the case of accidents, and protection of radiation sources against theft.
2. Floors and working surfaces in rooms where radioactive substances are used as unsealed radiation sources must be made of moisture-proof and easily cleansible materials resistant to chemicals. Intersections of floors and walls of such rooms must be rounded and floor-covering materials must reach at least 5 cm up the wall.
3. Radiation attenuation efficiency of materials used for construction of radiation shields and rooms and facilities accommodating radiation sources shall be assessed by the thickness of half-layer ($d_{1/2}$) or tenth-layer ($1/10$) of the material. The material with the thickness of half-layer attenuates radiation caused by a wide shaft of X-rays and gamma-rays twofold, and the material with the thickness of tenth-layer – tenfold. Thickness of half-layer and tenth-layer of the main materials used in radiation shields (in mm-s) for different X-ray radiation sources operating at highest potentials, and for different radionuclides emitting gamma-radiation, are presented in the Annex to this Regulation.

III Requirements for safe use of radiation sources

4. Licensees for activities involving radiation must have a minimum possible number of radiation sources and ensure the minimum total activity thereof.
5. Radiation sources must be kept in the rooms designated for this purpose and supplied with an alarm system.
6. Licensees for activities involving radiation must ensure calibration of all items of radiation monitoring equipment used. Calibration shall be carried out prior to commissioning of radiation sources, after each operation affecting the measuring parameters, and at least once a year.
7. Licensees for activities involving radiation shall draw up rules for performing activities involving radiation and shall post them on a notice board at the working place. These rules must contain:
 1. description of the nature of the risk posed by the activity involving radiation and measures to ensure safety;

2. reference to existence and location of rules to be applied in the case of accidents;
 3. tasks and obligations of radiation workers and the person responsible for radiation safety and their liability in the case of accidents;
 4. description of working operations;
 5. description of the radiation monitoring activities to be carried out during the work process;
 6. description and time schedule of procedures for checking the operational order of safety systems, and devices and components thereof;
 7. description of equipment for monitoring personal exposure doses;
 8. description of measures to be applied in the case of a fault of radiation sources, accidents or in the case of other incidents causing a risk of radiation;
 9. description of procedures for transfer, transportation, storing and disposal of radiation sources;
 10. rules for carrying out inventories of radiation sources, along with data on the location of each individual radiation source and on persons responsible for the safety of radiation sources;
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1. Continuous monitoring of radiation levels shall be ensured during the use of any radiation source;
 2. Before any operation involving a radiation source, the operator must ensure that the radiation source is in operational order.
 3. Upon completion of operations involving a radiation source, the operator must ensure that irradiation has ceased and that the radiation source is in the safety mode.

Minister Heiki Kranich

Deputy Secretary General (acting Secretary General) Eva Kraav

of 24 August 1999 of
the Minister of Environment

Thickness (in mm) of half-layer D1/2 and tenth-layer D1/10 of lead, concrete and iron for attenuation of wide-shaft X-ray and gamma-ray radiation

Peak potentials, U (kV), or radionuclide	Thickness of half-layer and tenth-layer of material (mm)					
	Lead (Pb)		Concrete		Iron (Fe)	
	D1/2	D1/10	D1/2	D1/10	D1/2	D1/10
X-ray radiation						
50	0.06	0.17	4.3	15		
70	0.017	0.52	8.4	28		
100	0.27	0.88	16	53		
125	0.28	0.93	20	66		
150	0.3	0.99	22.4	74		
200	0.52	1.7	25	84		
250	0.88	2.9	28	94		
Gamma-ray radiation						
¹³⁷ Cs	6.5	21.6	48	157	16	53
⁶⁰ Co	12	40	62	206	21	69
²²⁶ Ra	16.6	55	69	234	22	74